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## CLAIMS

1. Device for broadband transmission of digital optical signals between at least one first unit and at least one second unit traveling relative to the first unit along a given track, the device comprising, in association with the first unit:
  - a data source for generating a serial data stream;
  - an optical transmitter for generating optical signals from the serial data stream of the data source;10    - an optical waveguide for guiding the optical signals generated by the optical transmitter;  
and also comprising, in association with the second unit:
  - a coupling element for tapping optical signals from the optical waveguide;
  - an optical receiver for receiving the signals tapped by the coupling element;15    - a data sink for further processing the signals received by the optical receiver;  
wherein a controller is provided for controlling the data stream, the controller signaling, by means of a desired value, a predetermined data rate or package size selectively either to the data source or to the optical transmitter.
- 20    2. Device for broadband transmission of digital optical signals between at least one first unit and at least one second unit traveling relative to the first unit along a given track, the device comprising, in association with the first unit:
  - a data source for generating a serial data stream;
  - an optical transmitter for generating optical signals from the serial data stream of the data source;
  - an optical waveguide for guiding the optical signals generated by the optical transmitter;25    and also comprising, in association with the second unit:
  - a coupling element for tapping optical signals from the optical waveguide;
  - an optical receiver for receiving the signals tapped by the coupling element;30

- a data sink for further processing the signals received by the optical receiver;

wherein a controller is provided for controlling the data stream, the controller being disposed between the data source and the optical transmitter and

5 converting the data of the data source in accordance with a desired value to a predetermined data rate or to packages of predetermined package size.

3. Device according to claim 2,

wherein the controller comprises means for storing data, and also for issuing

10 stored data at different data rates to the transmitter.

4. Device according to claim 1 or 2,

wherein the desired value is set by a desired-value setting-means according to the actually prevailing transmission characteristics of the data path between the

15 optical transmitter and the optical receiver, or according to another measured parameter.

5. Device according to claim 1 or 2,

wherein

20 - an evaluation means is provided between the optical receiver and the data sink;

- the evaluation means has additional means for signaling incorrectly transmitted data to the controller by means of an auxiliary transmission channel; and

25 - the controller is adapted to repeat a transmission of incorrectly received data packages upon request by the evaluation means.

6. Device according to claim 1 or 2,

wherein a microcontroller is provided for control and diagnosis of the 30 device.

7. Device according to claim 1 or 2,

wherein the device is self-learning and during operation dynamically adapts to currently prevailing operating conditions.

5 8. Method for broadband transmission of digital signals between at least one first unit and at least one second unit traveling relative to the first unit along a given track, the method comprising the steps of:

- generating from a data source at the first unit a serial data stream;
- generating optical signals from the serial data stream of the data source

10 with an optical transmitter at the first unit;

- guiding the optical signals generated with the optical transmitter along an optical waveguide;
- tapping optical signals from the optical waveguide with a coupling element at the second unit;

15 - receiving the optical signals tapped with the coupling element with an optical receiver at the second unit;

- further processing the signals received by the optical receiver at a data sink at the second unit;

wherein the method comprises the following further steps, performed dynamically

20 during operation:

- determining at least one parameter which is representative of actually prevailing transmission characteristics of a data path between the transmitter and the receiver;
- forming a desired value of a data rate or data package size from the

25 determined at least one parameter;

- setting a data rate or a size of data packages for transmission along the data path in accordance with the desired value;
- transmitting a data stream at the set data rate or size of data packages along the data path to the receiver.